

CLAIMS

1. Process for the determination of parameters of a breath condensate by using at least one sensor for the measurement of the parameters and an analysis unit with display of the measurement results, comprising the steps of

delivering a solution from a storage container and applying said solution onto the at least one sensor within a closed cassette including the at least one sensor by action from outside the cassette on the storage containers, the solutions generating at least one of

a cassette flushing;
a conditioning of the at least one sensor;
a calibration or the at least one sensor; and
a dilution of the sample solution and/or elevation of the ion concentration or conductivity;

applying a sample solution onto the at least one sensor for parameter determination through an opening of the cassette; and

transmitting the measurement results originating from the at least one sensor to the cassette and from there transferred to the analysis unit.

2. Process according to claim 1, wherein the sample solution is sucked or injected into the cassette, preferably from a sample container or a sample collector system.

3. Process according to claim 1, wherein prior to the delivery into the cassette and/or the application onto the at least one sensor, a mixing of the substances in the storage containers is carried out by action from outside the cassette.

4. Process according to claim 1, wherein a calibration solution is produced by mixing the contents of two or more interconnected storage containers by action applied from outside the cassette and the solution is then delivered into the cassette and/or applied onto the at least one sensor.

5. Process according to claim 4, wherein a blister is used which contains a lyophilized enzyme as dry matter, or another compound which generates a quantitatively defined reaction in the calibration solution by which an analyte is created.

6. Process according to claim 5, wherein the analyte consists of short lived bio molecules or hydrogen peroxide.

7. Process according to claim 1, wherein the delivery of the solutions from the storage containers by action applied from outside the cassette is carried out with syringe shaped storage containers by operation of the syringe piston or with storage containers of flexible

construction by squeezing out of the respective container or by destruction of the flexible walls.

8. Process according to claim 1, further comprising the step of coordinating the temperature of the at least one sensor with the temperature of the sample solution during determination of the parameters of the breath condensate, especially, the temperature of the sample solution is adapted to the working temperature of the at least one sensor.

9. Process according to claim 1, comprising the further step of diluting the sample solution prior to introduction into the cassette with a buffer solution or a dilution solution or adjusting an ion concentration or conductivity necessary for the measurement.

10. Process according to claim 9, comprising the further step of capturing data and making them and made available for analysis which are apart from the pure measurement data, such as flow rate, temperature, freedom from air bubbles, time.

11. Process according to one of claims 10, wherein the cassette after the determination of parameters of the breath condensate and of a sample solution is disposed of.

12. Apparatus for carrying out the process according to claim 1 using at least one sensor for the measurement of the parameters and an analysis unit with display for the measurement results, comprising

the at least one sensor located in a closed cassette, the cassette including storage containers with

solutions for flushing and/or

solutions for the conditioning of the at least one sensor and/or

solutions for calibration and/or

with compounds for the production of a calibration solution and/or

for the dilution of the sample solution and/or

for elevation of the ion concentration or the conductivity of the sample solution,

whereby the contents of the storage containers are delivered fully or in metered amounts into the cassette and/or onto the at least one sensor by way of means acting on the storage containers from outside the cassette through the cassette walls, and

the cassette having at least one opening for introduction of the sample solution onto the at least one sensor and outer contacts for the transfer of measurement signals originating from the at least one sensor.

13. Apparatus according to claim 12, wherein the storage containers are syringe shaped and the means acting through the cassette walls operate the syringe pistons.

14. Apparatus according to claim 12, wherein the storage containers are of flexible construction and the means acting thereon effect a squeezing of the respective storage container or a destruction of the flexible walls.
15. Apparatus according to claim 12, wherein the storage containers are divided into separate sub containers and the means acting from the outside on the storage containers through the cassette walls first cause a mixing of the substances in the sub containers.
16. Apparatus according to claim 12, wherein a storage container includes a lyophilized enzyme as dry matter, or another reactive compound which generates a quantitatively defined reaction in the calibration solution.
17. Apparatus according to claim 12, wherein the cassette walls in the regions where they are penetrated by the means acting on the storage containers are provided with an elastic layer which forms an insulating layer between the operating means and the storage containers and/or the solutions in the cassette.
18. Apparatus according to claim 12, wherein
 - the storage containers are constructed as sleeves for receiving cartridges, whereby the cartridges are filled with
 - a flushing solution;
 - a solution for conditioning the at least one sensor and/or
 - a calibrating solution and/or compounds for the producing a calibration solution
 and/or
 - for the dilution of the sample solution and/or
 - for elevation of the ion concentration or the conductivity of the sample solution, and
 - the cartridges inserted into the storage containers deliver their content fully or in metered amounts into the cassette and/or onto the at least one sensor by means acting from the outside and through the cassette walls.
19. Apparatus according to claim 12, wherein the outlets of the storage containers and/or the cartridges are closed by a common valve or individual valves, which valve or valves are movable by exterior control to an open position.
20. Apparatus according to claim 12, wherein the means acting on the storage container or the cartridges are positioned in a cassette receptacle for individually controllably acting on the storage containers.
21. Apparatus according to claim 20, wherein the means are push rods operated by linear drives.

22. Apparatus according to claim 20, wherein the cassette receptacle includes contacts for receiving the measured data and preferably also the process data of the process from the contacts of the cassette.
23. Apparatus according to claim 12, wherein the at least one sensor is positioned permanently in the cassette or on an insert into the cassette.
24. Apparatus according to claim 12, wherein the cassette further includes a cooling or heating device for controlling the operating temperature.

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